VENTURA COUNTY AIR QUALITY ASSESSMENT GUIDELINES

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Ventura County
Air Pollution
Control District

VENTURA COUNTY

AIR QUALITY ASSESSMENT

GUIDELINES

Adopted by the Ventura County

Air Pollution Control Board

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VENTURA COUNTY AIR POLLUTION CONTROL BOARD

VENTURA COUNTY AIR POLLUTION CONTROL DISTRICT

Mission Statement

To protect public health and agriculture from the adverse effects of air pollution by identifying air pollution problems and developing a comprehensive program to achieve and maintain state and federal air quality standards.

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1. INTRODUCTION

1.1 INTRODUCTION

The California Environmental Quality Act (CEQA) requires evaluation of the environmental impacts, including air quality impacts, of proposed projects. CEQA applies to all discretionary activities proposed or approved by California public agencies, unless an exemption applies. The *Ventura County Air Quality Assessment Guidelines* (Guidelines) is an advisory document that provides lead agencies, consultants, and project applicants with a framework and uniform methods for preparing air quality evaluations for environmental documents.

The Guidelines recommend specific criteria and threshold levels for determining whether a proposed project may have a significant adverse air quality impact. The Guidelines also provide mitigation measures that may be useful for mitigating the air quality impacts of proposed projects. It should be noted, however, that these are guidelines only, and their use is not required or mandated by the Ventura County Air Pollution Control District (APCD or District). The final decision of whether to use these Guidelines rests with the lead agency responsible for approving the project.

The Guidelines are available for purchase from the District by calling 805/645-1433, or they can be downloaded free of charge from the District website at http://www.vcapcd.org/pubs.htm. This document is divided into eight chapters:

- Chapter 1: Introduction
- Chapter 2: Environmental Setting
- Chapter 3: Air Quality Significance Thresholds
- Chapter 4: Air Quality Management Plan Consistency
- Chapter 5: Estimating Ozone Precursor Emissions
- Chapter 6: Assessing Project-Specific, Localized, Non-Ozone Impacts
- Chapter 7: Mitigation Measures
- Chapter 8: General Conformity

The Guidelines are not applicable to equipment or operations required to have Ventura County APCD permits (Authority to Construct or Permit to Operate). APCD permits are generally required for stationary and portable (non-vehicular) equipment or operations that may emit air pollutants. This permit system is separate from CEQA and involves reviewing equipment design, followed by inspections, to ensure that the equipment will be built and operated in compliance with APCD regulations. The District has a two-step permit processing system. An Authority to Construct must be obtained before initiating construction or installation of the equipment or operations subject to APCD permit requirements. The second step of the process requires the applicant to apply for a Permit to Operate upon completion of construction or installation authorized by an Authority to Construct.

Moreover, the emissions from equipment or operations requiring APCD permits are not counted towards the air quality significance thresholds. This is for two reasons. First, such equipment or processes are subject to the District's New Source Review permit system, which is designed to produce a net air quality improvement. Second, facilities are required to mitigate emissions from equipment or processes subject to APCD permit by using emission offsets and by installing Best Available Control Technology (BACT) on the process or equipment.

To determine whether or not the proposed equipment or operation requires an APCD Permit, contact the APCD Engineering Division at 805/645-1401. Table 1-1 lists examples of equipment and operations that may require an APCD permit pursuant to the APCD Rules and Regulations. See Appendix B, Common Equipment and Processes Requiring a Ventura County APCD Permit To Operate, for more a more detailed list of processes and equipment that require an APCD Permit to Operate.

The District assists project applicants and lead agencies with preparation of environmental documents by providing air quality data and other needed information. The District also reviews and comments on air quality sections of environmental documents and prepares air quality sections of environmental documents for agencies upon request.

The District may be involved in the CEQA process in several ways, as described below:

Lead Agency - The District acts as a lead agency when it has the primary authority to implement or approve a discretionary project. This typically occurs when air pollution rules and air quality plans are developed.

Responsible Agency - The District acts as a responsible agency when it has discretionary approval authority over an aspect of a project, but does not have the primary discretionary authority of a lead agency. As a responsible agency, the District may coordinate the environmental review process with the District's permitting process.

Commenting Agency - The APCD acts as a commenting agency for projects that have the potential to impact air quality and for which it is not a lead agency or a responsible agency. To this end, the APCD regularly reviews and provides comments on environmental documents prepared by lead agencies.

TABLE 1-1
EXAMPLES OF EQUIPMENT AND OPERATIONS THAT MAY REQUIRE AN APCD PERMIT

Combustion Equipment
- Boilers and process heaters
- Engines 50 HP or greater
- Gas turbines
- Incinerators

Equipment That Emit Dust or Other Particulate Matter
- Concrete batch plants
- Asphalt concrete plants
- Rock, sand, and aggregate plants
- Abrasive blasting operations

Equipment and Processes That Emit Solvents or Other Reactive Organic Compounds (ROC)
- Dry-cleaning machines
- Gasoline tanks and dispensing facilities
- Contaminated soil or groundwater remediation systems
- General painting and coating operations

Equipment and Processes That Emit Air Toxics or May Cause a Nuisance
- Chrome plating operations
- Operations such as spa, bathtub, or counter-top manufacturing that use polyester resins
- Wood stripping operations that use methylene chloride
- Agricultural produce fumigation chambers that use organic gases

The District is available for consultation at any time during the project review and approval process. At certain times, consultation is required by CEQA. When the District has discretionary approval authority over an aspect of a project for which another public agency is serving as lead agency, the District should be consulted as a responsible agency. Moreover, CEQA requires and provides opportunities for District review before the preparation of the environmental document and during public review of the completed environmental document.

The District encourages local jurisdictions to address air quality issues as early as possible in the project review process. Local jurisdictions should work with project applicants on issues such as potential land use conflicts and site design to encourage transportation alternatives to the automobile. Resolving land use and site design issues while a proposal is at the conceptual stage maximizes opportunities to incorporate measures to minimize a project's air quality impacts. By the time a project gets to the CEQA process, it may be more costly and time-consuming to redesign the project to incorporate air quality mitigation measures. Therefore, features benefiting air quality should be incorporated into a project before significant resources have been expended designing the project.

In Ventura County, motor vehicles are the largest category of air pollutant emissions. Land use decisions are critical to air quality planning because land use patterns influence transportation usage. The District encourages site planning that incorporates land use design features that benefit air quality. Project applicants and consultants should consider land use design issues during project design to:

- Encourage the development of higher density housing and employment centers near public transit corridors.
- Encourage compact development featuring a mix of uses that locates residences near jobs and services.
- Provide services such as food sales, banks, post offices, and other personal services within office parks and other large developments.
- Encourage infill development.
- Ensure that the design of streets, sidewalks, and bike paths within a development encourages walking and biking.
- Orient building entrances toward sidewalks and transit stops.
- Provide landscaping to reduce energy demand for cooling.
- Orient buildings to minimize energy required for heating and cooling.

1.2 BACKGROUND

Air pollution is hazardous to human health. It also diminishes the yield and quality of many agricultural crops, reduces atmospheric visibility, degrades soils and materials, and damages native vegetation. State and national ambient air quality standards are established to protect public health and welfare, and minimize the effects mentioned above. These standards pertain to pollutants in ambient air, the air that people breathe outside of buildings as they go about their daily activities.

The federal government has established National Ambient Air Quality Standards (NAAQS) to protect public health (primary standards); and welfare, such as property and agriculture (secondary standards). California has separate, more stringent standards. There are state and national standards for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead (Pb). In addition, California has standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. Table 2-1, "Ambient Air Quality Standards," presents federal and state ambient air quality standards. Regions throughout the state and country are classified as being either attainment or nonattainment areas, depending on the number of times an air quality standard has been exceeded.

The air pollutants of most concern in Ventura County are ozone and particulate matter. Ventura County is an attainment area for all standards presented in Table 2-1, "Ambient Air Quality Standards," except the following:

Ozone	1 Hour	State and Federal: Nonattainment
	8 Hour	Federal: Not designated*
PM_{10}	24 Hour	State: Nonattainment**
	Annual Average	State: Nonattainment**
$PM_{2.5}$	24 Hour	Federal: Not designated
	Annual Average	State and Federal: Not designated

* The California Air Resources Board (ARB)has recommended to the United States Environmental Protection Agency (U.S. EPA) a designation of nonattainment for Ventura County.

** The ARB has designated Ventura County a nonattainment area based upon the state 24 hour and annual average PM_{10} standards

Check the District website at http://www.vcapcd.org for the most current attainment status.

Ozone, the primary ingredient of smog, is formed in the atmosphere through complex chemical reactions involving ROC, nitrogen oxides (NOx), and ultraviolet energy from the sun.

Particulate matter is comprised of very small solids or liquids, such as dust, soot, aerosols, fumes, and mists. The particles of primary concern are those with an aerodynamic diameter of 10 microns or smaller (PM_{10}). From a health perspective, the most damaging component of PM_{10} is the fine particle fraction 2.5 microns or smaller ($PM_{2.5}$). These particles have the greatest likelihood of being inhaled deeply and remaining in the lungs.

The federal Clean Air Act Amendments of 1990 (CAAA) require that states achieve the NAAQS by specified dates, based on the severity of an area's air quality problem. Ventura County is designated a severe ozone nonattainment area, and as such, is required by the CAAA to attain the federal one-hour ozone standard by November 15, 2005 (see Section 1.3.2, "Federal Clean Air Act"). Ventura County has made significant progress toward attainment of the federal one-hour ozone standard. For years 2000 - 2002, Ventura County averaged only one ozone exceedance day per year, technically meeting the federal standard. Ventura County is still officially designated a nonattainment area for the federal standard, however. Ventura County has not been designated for the federal eight-hour ozone standard.

As of April 2003, air quality data indicate that Ventura County is in compliance with the federal annual $PM_{2.5}$ standard; official designation has not yet taken place.

Ventura County must also comply with the requirements of the California Clean Air Act (CCAA). The CCAA became effective January 1, 1989, and requires that all areas of California attain and maintain the State Ambient Air Quality Standards by the earliest practicable date (see Section 1.3.3, "California Clean Air Act"). Ventura County frequently exceeds the state ozone standard and is designated a severe ozone nonattainment area. The state ozone standard is more stringent than the federal one-hour ozone standard, and will be more difficult to attain.

PM_{10} concentrations in Ventura County exceed the state 24-hour air quality standard. Ventura County has not yet been classified for the state new PM_{10} or $PM_{2.5}$ annual average standards.

1.3 REGULATORY SETTING

1.3.1 California Environmental Quality Act

CEQA (Public Resources Code (PRC) §§21000 - 21177) was enacted by the State Legislature in 1970. The purpose of CEQA is to help ensure that governmental decision-makers and the public are fully informed of potential significant environmental effects of proposed projects and activities. CEQA also requires that environmental impacts be avoided or reduced where feasible. Project alternatives must be considered that accomplish the project purpose if the project is found to have significant impacts. Mitigation measures are employed when no feasible alternative can be identified. Any feasible mitigation measure that reduces the severity of a significant impact to insignificance must be implemented. When there are no feasible, viable alternatives, and there are no feasible mitigation measures available to reduce the project's impact, a statement of overriding considerations can be adopted. This enables a public agency to approve a project despite significant environmental effects. However, a public agency that approves a project with significant impacts after all feasible mitigation measures have been applied, must disclose to the public its reasons for approving the project despite the significant impacts.

CEQA applies to activities directly undertaken by governmental agencies, activities financed in whole or in part by governmental agencies, and private activities that require approval from governmental agencies. There are several basic steps in the CEQA process. First, an agency determines whether a project is subject to CEQA or exempt from CEQA analysis. Second, if the project is subject to CEQA, the agency prepares an

Initial Study to determine whether the project may have a significant effect on the environment. If there is no substantial evidence that the project may have a significant effect, the agency prepares a Negative Declaration (ND). If the project can be modified to avoid or reduce the significant effect to a level of less than significant (and there is no substantial evidence that the project as revised may have a significant effect), the agency prepares a Mitigated Negative Declaration (MND). If the Initial Study shows that the project may have a significant effect, and the effects cannot be reduced to a less than significant level with an MND, the agency prepares an Environmental Impact Report (EIR).

An EIR is a detailed report that analyzes the environmental effects of a project, identifies potential measures to mitigate identified significant adverse environmental effects, and potential project alternatives. If mitigation measures or alternatives are not available or are infeasible, a project may still be approved if the lead agency makes certain formal findings.

The California Resources Agency adopts procedures, known as the "CEQA Guidelines" (California Code of Regulations (CCR) §§15000 - 15387), that provide detailed steps that lead agencies must follow to implement CEQA. Sections of CEQA and the CEQA Guidelines that are relevant for the preparation of air quality analyses are presented in Appendix C, Sections of CEQA and the CEQA Guidelines Relevant to Air Quality Impact Analysis.

1.3.2 Federal Clean Air Act

The first comprehensive national air pollution legislation was the federal Clean Air Act of 1970. In 1977, the federal Clean Air Act was amended to require plans for meeting the national health-based standards "as expeditiously as practicable," but no later than December 31, 1982. However, the Clean Air Act permitted the U.S. EPA to extend the attainment date of some ozone and carbon monoxide nonattainment areas.

In 1990, the federal Clean Air Act was significantly amended. Under the CAAA, areas that do not meet the federal one-hour ozone standard are classified according to the severity of each area's respective ozone problem. The classifications are Marginal, Moderate, Serious, Severe, and Extreme. Marginal areas are closest to meeting the federal one-hour ozone standard. Extreme areas have the worst air quality problems. Areas with more severe ozone problems have progressively more stringent requirements to meet under the federal Clean Air Act. An area's classification determines how long the area has to attain the federal ozone standard. Marginal areas had three years; Moderate areas - six years; Serious areas - nine years; Severe areas - either 15 or 17 years, depending on the magnitude of their ozone problem; and, Extreme areas - 20 years. The South Coast Air Basin is the only area in the country designated as Extreme. Ventura County is a Severe area for ozone and must attain the federal one-hour ozone standard by 2005.

The CAAA contain a number of requirements designed to improve air quality. These include motor vehicle emission limits, pollution controls on industrial facilities, use of low-polluting vehicle fuels, permit and compliance programs, and economic incentives to encourage industries to voluntarily curtail emissions.

In July 1997, the U.S. EPA approved new federal standards for $PM_{2.5}$, and modified the PM_{10} and ozone standards. The new federal standards are presented in Table 2-1, "Ambient Air Quality Standards."

1.3.3 California Clean Air Act

The CCAA was enacted on September 30, 1988, and became effective January 1, 1989. The purpose of the CCAA is to achieve the more stringent health-based state clean air standards at the earliest practicable date.

The state standards are more stringent than the federal air quality standards. Similar to the federal Clean Air Act, the CCAA also classifies areas according to pollution levels. Under the CCAA, Ventura County is a severe ozone nonattainment area, and is a state PM_{10} nonattainment area. The CCAA requires that the standards be attained at the earliest practicable date. Further, districtwide air emissions must be reduced at least five percent per year (averaged over three years) for each nonattainment pollutant or its precursors. A district may achieve a smaller average reduction if the district can demonstrate that, despite inclusion of every feasible measure in its air quality plan, it is unable to achieve the five percent annual reduction in emissions.

On June 20, 2002, the ARB approved revisions to the PM_{10} annual average standard, and established an annual average standard for $PM_{2.5}$. These standards are presented in Table 2-1, "Ambient Air Quality Standards."

1.3.4 Ventura County Air Quality Management Plan

The 1991 Air Quality Management Plan (AQMP) was prepared in response to the CCAA. The 1991 Plan elaborated on information contained in the 1982 and 1987 AQMPs. It also included new and modified control measures designed to move the county further toward achieving state clean air standards.

The 1994 AQMP was prepared to satisfy the planning requirements of the CAAA and to outline a strategy for meeting the federal one-hour ozone clean air standard while accommodating anticipated growth. The Plan indicated that Ventura County would attain the federal one-hour air quality standard for ozone by 2005.

The District prepared a revision to the 1994 AQMP in 1995. This revision updated information that had changed since the 1994 AQMP, including minor adjustments to the 1990 baseline emission inventory, actions taken by the ARB to approve additional control strategies, changes to the photochemical modeling, and several other changes. The 1995

Plan Revision indicated that Ventura County would attain the federal one-hour ozone standard by 2005. It focused on ways to reduce ozone levels, and did not address PM_{10}, since Ventura County is an attainment area for the federal PM_{10} standard. The U.S. EPA approved the 1994 AQMP and 1995 AQMP Revision on February 7, 1997.

The District prepared a 1997 AQMP Revision to update the proposed adoption and implementation dates for nine control measures that were included in the 1995 Plan Revision. The U.S. EPA approved the 1997 AQMP Revision on April 21, 1998.

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2. ENVIRONMENTAL SETTING

2.1 INTRODUCTION

Section 15125 of the California Environmental Quality Act (CEQA) Guidelines states that "an environmental impact report (EIR) must include a description of the environment in the vicinity of the project, as it exists before the commencement of the project, from both a local and regional perspective." This chapter of the *Ventura County Air Quality Assessment Guidelines* (Guidelines) can be used as the basis for the air quality setting section of environmental documents. It also provides a description of the environmental factors that affect regional and local air pollutants.

The information in the air quality setting section of an EIR should include a discussion of the existing levels of air pollutants at the proposed project site and significant sources of air emissions, both stationary and mobile, at the site.

2.2 AIR QUALITY SETTING

The United States Environmental Protection Agency (U.S. EPA) and the California Air Resources Board (ARB) have established ambient air quality standards to protect the health and welfare of the general public. Regions throughout the state and country are classified as being either attainment or nonattainment for specific criteria pollutants, depending on the number of times an air quality standard is exceeded. Table 2-1, "Ambient Air Quality Standards," shows federal and state air quality standards for criteria pollutants.

Ventura County is located in the South Central Coast Air Basin (comprised of Ventura County, Santa Barbara County, and San Luis Obispo County, see Figure 2-1, "Ventura County Air Pollution Control District Boundaries").

Ventura County is a severe nonattainment area for the federal and state one-hour ozone standards, and has been recommended by the ARB as a nonattainment area for the federal eight-hour ozone standard. Table 2-2, "Number of Days Exceeding the Federal and State Ambient Air Quality Standards for Ozone," shows the number of days exceeding the federal and state ozone standards from 1990 to 2002. Table 2-3, "Maximum Ozone Concentrations - Ventura County," shows the maximum one-hour ozone concentrations in Ventura County during this same period. Ozone concentrations have declined steadily at most air monitoring stations, as have the number of exceedances, since 1980. These air quality improvements have occurred despite a growing population. Between 1980 and 2002, Ventura County's population increased by 253,500, a 47.6 percent increase. Although ozone levels have declined significantly in recent years, the county still experiences frequent violations of the state ozone standard. Inland areas of the county (Simi Valley, Thousand Oaks, and Piru) exceed the ozone standard more frequently than the coastal areas.

TABLE 2-1
AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards [1]	National Standards [2]	
		Concentration [3]	Primary [3,4]	Secondary [3,5]
Ozone (O_3)	1 Hour	0.09 ppm (180 μg/m^3)	0.12 ppm (235 μg/m^3) [6]	Same as Primary Standard
	8 Hour	----	0.08 ppm (157 μg/m^3) [6]	
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard	65 μg/m^3	Same as Primary Standard
	Annual Arithmetic Mean	12 μg/m^3 *	15 μg/m^3	
Respirable Particulate Matter (PM_{10})	24 Hour	50 μg/m^3	150 μg/m^3	Same as Primary Standard
	Annual Arithmetic Mean	20 μg/m^3 *	50 μg/m^3	
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	None
	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	----	0.053 ppm (100 μg/m^3)	Same as Primary Standard
	1 Hour	0.25 ppm (470 μg/m^3)	----	
Lead	30 Day Average	1.5 μg/m^3	----	----
	Calendar Quarter	----	1.5 μg/m^3	Same as Primary Standard
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	----	0.030 ppm (80 μg/m^3)	----
	24 Hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	----
	3 Hour	----	----	0.5 ppm (1300 μg/m^3)
	1 Hour	0.25 ppm (655 μg/m^3)	----	----
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer – visibility of ten miles or more (0.07 – 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent.	No National Standards	
Sulfates	24 Hour	25 μg/m^3		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m^3)		

* On June 20, 2002, the Air Resources Board approved staff's recommendation to revise the PM_{10} annual average standard to 20 μg/m^3 and to establish an annual average standard for $PM_{2.5}$ of 12 μg/m^3. These standards took effect on July 5, 2003. Information regarding these revisions can be found at http://www.arb.ca.gov/research/aaqs/std-rs/std-rs.htm.

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter PM_{10}, $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly concentrations over the standard is equal or less than one. The 8-hour ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr, Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect public health.
5. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse affects of a pollutant.
6. New national 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on July 18, 1997. Contact U.S. EPA for further clarification and current national policies.

FIGURE 2-1
VENTURA COUNTY AIR POLLUTION CONTROL DISTRICT BOUNDARIES

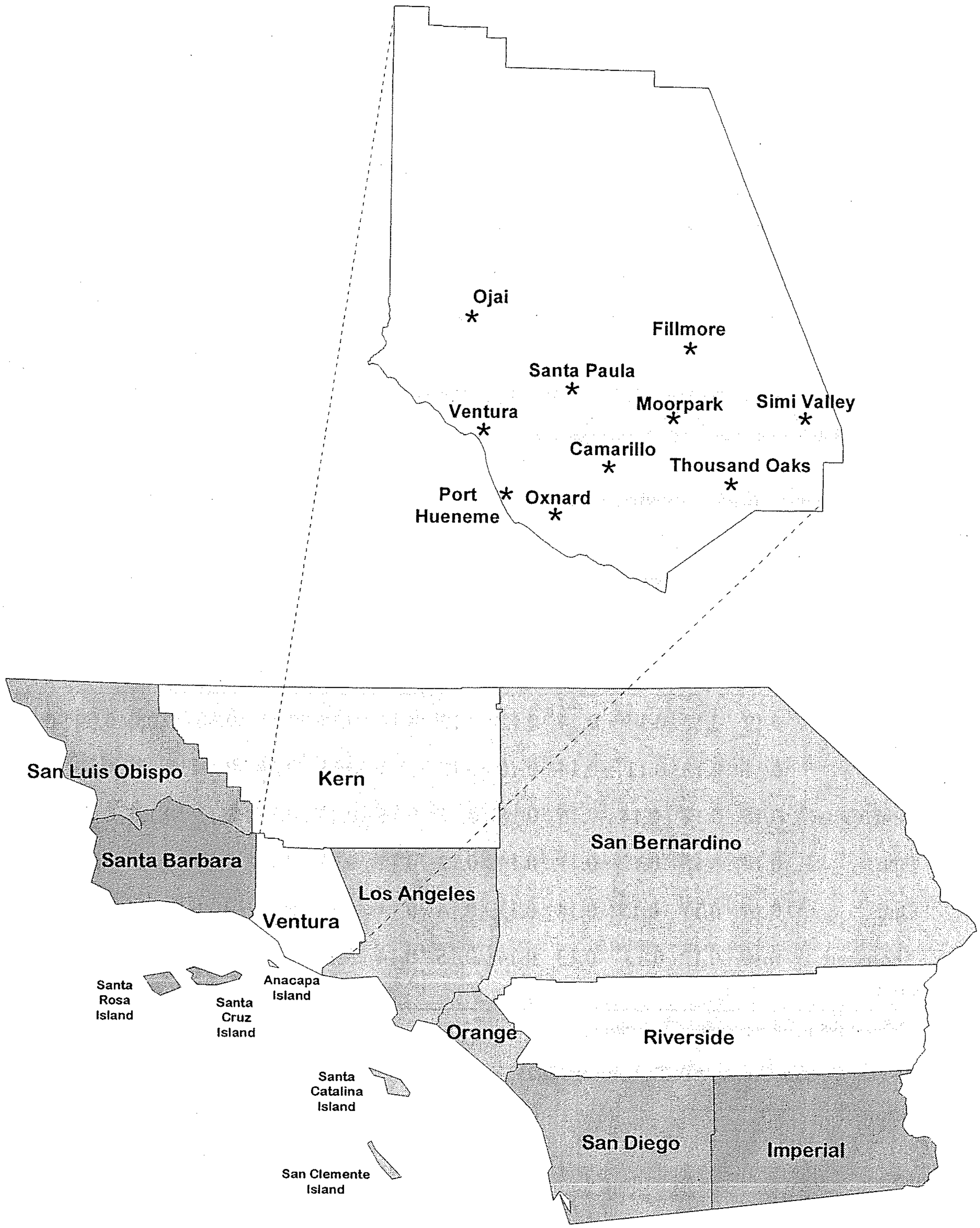

TABLE 2-2
NUMBER OF DAYS EXCEEDING THE FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS FOR OZONE
(1-hour standard*)

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
El Rio	0/9**	0/12	3/17	1/8	0/7	0/7	0/8	0/2	0/1	0/1	0/0	0/0	0/0
Ventura	0/5	2/12	0/4	2/5	0/3	0/4	1/10	0/2	0/0	0/0	0/0	0/0	0/0
Simi Valley	14/86	32/97	6/58	8/40	15/80	22/85	13/73	2/47	4/37	2/31	1/31	2/32	0/14
Piru	4/46	4/44	0/15	0/4	2/19	1/20	0/17	0/6	1/4	0/3	0/3	0/16	0/10
Ojai	2/27	4/30	4/33	1/23	2/17	2/27	2/38	0/10	0/13	0/7	0/15	1/17	1/15
Thousand Oaks	3/27	0/20	2/31	4/22	2/28	1/28	5/26	0/20	1/13	0/9	0/6	0/4	0/3
Countywide	18/99	33/106	10/69	13/58	17/88	23/90	17/80	2/59	5/41	2/33	1/37	2/34	1/23

*Federal 1-hour standard: >0.12 parts per million; State 1-hour standard: >0.09 parts per million.

**Number of days exceeding national standard/number of days exceeding state standard.

Source: Ventura County Air Pollution Control District (APCD), February 2003.

TABLE 2-3
MAXIMUM OZONE CONCENTRATIONS - VENTURA COUNTY
(hourly average - parts per million)

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
El Rio	0.12	0.12	0.14*	0.14	0.12	0.12	0.12	0.10	0.11	0.10	0.08	0.09	0.09
Ventura	0.11	0.13	0.11*	0.14	0.10	0.12	0.13	0.11	0.09	0.09	0.08	0.09	0.08
Simi Valley	0.16	0.17	0.14	0.15	0.16	0.17	0.16	0.13	0.17	0.13	0.13	0.13	0.12
Piru	0.14	0.15	0.12	0.11	0.14	0.13	0.12	0.11	0.13	0.10	0.10	0.12	0.12
Ojai	0.14	0.17	0.15	0.14	0.13	0.14	0.14	0.11	0.11	0.11	0.11	0.13	0.13
Thousand Oaks	0.17	0.12	0.13*	0.13	0.14	0.15	0.14	0.12	0.13	0.11	0.10	0.12	0.12

*Does not meet representative criteria.

Source: Ventura County APCD, February 2003.

Ventura County also is a nonattainment area for the state standard for PM_{10} (particulate matter with an aerodynamic diameter of 10 microns or smaller). Table 2-4, "Number of Days Exceeding the State Ambient Air Quality Standards for PM_{10}," shows the number of violations of the state PM_{10} standard from 1990 to 2002.

Ambient levels of other pollutants in Ventura County do not violate state or federal standards.

TABLE 2-4
NUMBER OF DAYS EXCEEDING THE STATE AMBIENT AIR QUALITY STANDARDS FOR PM_{10}
(24-hour standard*)

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
El Rio	10	4	5	4	2	3	1	3	1	1	1	2	2
Ventura	4	4	2	1	1	2	0	**	**	**	**	**	**
Simi Valley	11	16	7	4	4	8	2	4	0	6	3	4	3
Piru	8	11	5	5	2	4	5	8	1	2	3	1	1
Ojai	7	7	1	1	1	0	0	0	2	2	0	0	0
Thousand Oaks	**	**	3	2	4	4	1	3	0	5	6	1	0
Countywide	20	24	10	10	8	9	7	13	3	10	9	5	6

*Greater than 50 micrograms per cubic meter.
**No monitor at location.

Source: Ventura County APCD, February 2003.

2.3 METEOROLOGICAL FACTORS AFFECTING AIR QUALITY

The air above Ventura County often exhibits weak vertical and horizontal dispersion characteristics, which limit the dispersion of emissions and cause increased ambient air pollutant levels. Persistent temperature inversions prevent vertical dispersion. The inversions act as a "ceiling" that prevents pollutants from rising and dispersing. Mountain ranges act as "walls" that inhibit horizontal dispersion of air pollutants.

The diurnal land/sea breeze pattern common in Ventura County recirculates air contaminants. Air pollutants are pushed toward the ocean during the early morning by the land breeze, and toward the east during the afternoon, by the sea breeze. This creates a "sloshing" effect, causing pollutants to remain in the area for several days. Residual emissions from previous days accumulate and chemically react with new emissions in the presence of sunlight, thereby increasing ambient air pollutant levels.

This pollutant "sloshing" effect happens most predominantly from May through October ("smog" season). Air temperatures are usually higher and sunlight more intense during the "smog" season. This explains why Ventura County experiences the most exceedances of the state and federal ozone standards during this six-month period.

2.4 EFFECTS OF AIR POLLUTION

2.4.1 Health Effects

Ambient air pollution is a major public health concern. The most well-known acute air pollution episodes occurred in the Meuse Valley, Belgium in 1930 (60 deaths); in Donora, Pennsylvania in 1948 (20 deaths); and London, England in 1952 (4,000 deaths). Although acute air pollution episodes with such readily evident excess deaths are now unlikely in the United States, air pollution continues to be linked to respiratory illness and a slight increase in death rates.

According to the ARB, 80,000 deaths that occur each year in California may be attributed to illnesses aggravated by air pollution. While air pollution affects everyone, some people are more susceptible to its effects than others. Research has established that air pollution:

- Aggravates heart and lung illnesses.
- Adds stress to the cardiovascular system, forcing the heart and lungs to work harder to provide oxygen to the body.
- Speeds the aging process of the lungs, accelerating the loss of lung capacity.
- Damages respiratory system cells even after symptoms of minor irritation disappear.
- May cause immunological changes.
- Causes lung inflammation.
- Increases health care utilization (hospitalization, physician, and emergency room visits).
- May contribute to the development of diseases such as asthma, bronchitis, emphysema, and cancer.
- May cause a reduction in life span.

The federal government estimates that between 10 and 12 percent of United States total health costs are attributable to air pollution-related illnesses. Air pollution is thought to be responsible for a two percent loss in United States worker efficiency. If ozone pollution were reduced in urban areas, there would be approximately 49.9 million fewer cases of air pollution-related illnesses annually in the United States; asthma attacks alone would decrease by 1.9 million annually.

On a per-capita basis, the health benefits measured in dollars from reducing ozone concentrations to federal and state one-hour standards are estimated to be $196 and $214 each year, respectively, for every person living in the South Coast Air Basin (the greater Los Angeles area). Per capita annual health benefits associated with meeting federal and state particulate standards are estimated to be $575 and $972, respectively. Assuming the per capita savings in the South Coast Air Basin are applicable to Ventura County, the projected health cost savings for achieving the PM_{10} standard in Ventura County is estimated to be $45 to $69 million per year. According to the U.S. EPA, for every dollar spent on air pollution controls since 1970, $45 has been gained in health and environmental benefits.

2.4.2 Effects on Plants

2.4.2.1 Damage to Agriculture

Increased health costs are only one portion of the total economic effects that result from air pollution. Many of the major agricultural crops grown in California, including Ventura County, are significantly damaged by air pollution, with from 20 to 50 percent of losses in some crop yields. Studies on the effects of smog exposure on fruit trees (specifically orange trees, ornamental plants, and home garden plants) have shown reductions in fruit yield and visible plant damage resulting from smog. One study showed that productivity of Valencia orange trees can be reduced by 30 percent when exposed to ozone levels that frequently occur in Southern California. Another study showed that naval orange trees produced about 50 percent more fruit when protected from smog. In addition, trees protected from smog dropped fewer leaves. The statewide average yield loss for citrus due to air pollution was about 11 percent in 1988.

Smog and particulates interfere with photosynthesis and can injure leaves, reduce growth, reduce crop quality, reduce reproductive capacity, increase weed and pest infestation, and/or kill the plant, thereby reducing crop yield. Damage often occurs before visible symptoms of injury are noticed. Particulates also can interfere with beneficial biological pest control by preventing beneficial insects from preying on agricultural crop-eating pests.

Areas in California where plant damage from air pollution has been reported coincides with the areas of highest population density. These areas include a triangular zone extending from the Mexican border to approximately 80 miles north and eastward of Ventura. Some of the greatest plant damage from air pollution is seen on fruit and vegetable crops, and flowers.

According to a 1987 study by the ARB, a number of important statewide crops suffer substantial yield losses due to ozone. Air pollution has been estimated to cost the agricultural industry in California between $150 million and $1 billion a year. An economic analysis of the costs of air pollution to agriculture attributes 90 percent of direct crop losses from air pollution to ozone. Nationally, ozone is estimated to account for a five to ten percent loss in agricultural production. The cost of this loss from ozone is about $5 billion each year. The greatest agricultural losses due to air pollution are in those crops in which the foliage is the marketed portion of the plant, such as lettuces, alfalfa, and spinach. Beans are no longer commercially grown in Southern California because of their susceptibility to air pollution.

Damage to agricultural crops from air pollution is an economic concern in Ventura County. According to the ARB, several agricultural crops grown in Ventura County suffer from exposure to air pollution. One study concluded that ozone exposure in Ventura County caused a reduction in orange crop yield of 19 percent in 1991. For that same year, lemon crops suffered an eight percent yield reduction, sweet corn seven percent, and dry beans 19 percent yield reductions, respectively.

2.4.2.2 Damage to Natural Vegetation

Air pollution is known to harm all major native plant groups, including flowering plants, conifers, ferns, mosses, lichens, and fungi. The effects on native vegetation are similar to those of agricultural crops. In the Geysers region of Napa, Lake, and Sonoma counties, injury to native plants, such as oaks and maples, has taken place downwind of geothermal power plants. Trees and other plant life in the San Joaquin Valley and adjacent Sierra Nevada Mountains suffer from air pollution generated in the upwind urban areas. Ozone damage has been observed in the forests of Southern California and in the Sierra Nevada mountains. Certain species of oak and pine trees are sensitive to air pollution.

Studies on Ponderosa and Jeffrey Pines trees in the 1980s revealed that two out of every five Ponderosa and Jeffrey Pine trees exhibited needle damage from air pollution. The National Park Service has measured an eleven percent reduction in the growth rate of selected Jeffrey Pine trees since 1965. Pine needles exposed to ozone develop yellow, blotchy marks and needles older than two years fall off, giving branches a whiskbroom appearance. Needles and debris from trees killed by smog not only increase the risk of forest fire, but reduce seed germination and the chances of seedling survival.

Coastal sage scrub and chaparral also are sensitive to air pollutants. The most important effect is a reduced ability to cope with drought, disease, and insects. Air pollution may put these plants at a reproductive disadvantage by causing them to produce fewer seeds. These conditions can lead to changes in succession, resulting in a totally different plant community occupying a site.

Total yield and quality of forage and range are all affected by air pollution. This presents serious consequences for the state's livestock industry. Compared to grasses grown in clean air, loss in yield of grasses grown in smoggy air is as high as 10 to 20 percent. Moreover, ozone reduces carbohydrate levels of grasses by up to 56 percent.

2.4.3 Damage to Materials

In addition to human health and vegetation, air pollution also damages materials such as plastics, rubber, paint, and metals. Damage includes erosion and discoloration of paint, cracking of rubber, corrosion of metals and electrical components, soiling and decay of building stone and concrete, fading, a reduction of tensile strengths of fabrics, and soiling and crumbling of nonmetallic building materials. High smog concentrations significantly shorten the lifespan of materials, which increases maintenance and replacement costs. The national cost of damage to materials caused by ozone is estimated to range from $1.5 to $3.9 billion every year.

2.5 CRITERIA AIR POLLUTANTS

A criteria air pollutant is any air pollutant for which ambient air quality standards have been set by the U.S. EPA or the ARB. Criteria pollutants include ozone (O_3), fine particulate matter ($PM_{2.5}$), respirable particulate matter (PM_{10}), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), sulfur dioxide (SO_2), visibility-reducing particles, sulfates, and hydrogen sulfide. The sections below provide more detail about the criteria pollutants of concern in Ventura County.

2.5.1 Ozone

Ozone is formed in the atmosphere by a series of complex chemical reactions and transformations in the presence of sunlight. Oxides of nitrogen (NOx) and reactive organic compounds (ROC) are the principal constituents in these reactions. Ozone is a pungent, colorless, toxic gas and is the major air pollutant of concern in Ventura County.

Sources: Ozone is known as a secondary pollutant because it is formed in the atmosphere through a complex series of chemical reactions, rather than emitted directly into the air. The major sources of NOx in Ventura County are motor vehicles and other combustion processes. The major sources of ROC in Ventura County are motor vehicles, cleaning and coating operations, petroleum production and marketing operations, and solvent evaporation.

Effects: Ozone is a strong irritating gas that can chemically burn and cause narrowing of airways, forcing the lungs and heart to work harder to provide oxygen to the body. A powerful oxidant, ozone is capable of destroying organic matter – including human lung and airway tissue; it essentially burns through cell walls. Ozone damages cells in the lungs, making the passages inflamed and swollen. Ozone also causes shortness of breath, nasal congestion, coughing, eye irritation, sore throat, headache, chest discomfort, breathing pain, throat dryness, wheezing, fatigue, and nausea. It can damage alveoli, the individual air sacs in the lungs where oxygen and carbon dioxide are exchanged. Ozone has been associated with a decrease in resistance to infections. People most likely to be affected by ozone include the elderly, the young, and athletes. Ozone may pose its worst health threat to people who already suffer from respiratory diseases such as asthma, emphysema, and chronic bronchitis.

2.5.2 Particulate Matter 10 Microns or Smaller in Diameter (PM_{10})

PM_{10} consists of particulate matter (fine dusts and aerosols) ten microns or smaller in aerodynamic diameter. Ten microns is about one-seventh the width of a human hair. When inhaled, particles larger than ten microns generally are caught in the nose and throat and do not enter the lungs. PM_{10} gets into the large upper branches of the lungs just below the throat, where they are caught and removed (by coughing, spitting, or swallowing).

Sources: The primary sources of PM_{10} include: dust, paved and unpaved roads, diesel exhaust, acidic aerosols, construction and demolition operations, soil and wind erosion, agricultural operations, residential wood combustion, and smoke. Secondary sources of PM_{10} include tailpipe emissions and industrial sources. these sources have different constituents, and therefore, varying effects on health. Road dust is compost of many particles other than soil dust. It also includes engine exhaust, tire rubber, oil, and truck load spills. Diesel exhaust contains many toxic particle and elemental carbon (soot), and is considered a toxic air contaminant in California. Airborne particles absorb and adsorb toxic substances and can be inhaled and lodge in the lungs. Once in the lungs, the toxic substances can be adsorbed into the bloodstream and carried throughout the body.

PM_{10} concentrations tend to be lower during the winter months because meteorology greatly affects PM_{10} concentrations. During rain, concentrations are relatively low, and on windy days, PM_{10} levels can be high. Photochemical aerosols, formed by chemical reactions with manmade emissions, may also influence PM_{10} concentrations.

Effects: Elevated ambient particulate levels are associated with premature death, an increased number of asthma attacks, reduced lung function, aggravation of bronchitis, respiratory disease, cancer, and other serious health effects.

Short-term exposure to particulates can lead to coughing, minor throat irritation, and a reduction in lung function. Long-term exposure can be more harmful. The U.S. EPA estimates that eight percent of urban non-smoker lung cancer risk is due to PM_{10} in soot from diesel trucks, buses, and cars. Additional studies by the U.S. EPA and the Harvard School of Public Health estimate that 50,000 to 60,000 deaths per year in the United States are caused by particulates. PM_{10} particles collect in the upper portion of the respiratory system, affecting the bronchial tubes, nose, and throat. They contribute to aggravation of asthma, premature death, increased number of asthma attacks, bronchitis, reduced lung function, respiratory disease, aggravation of respiratory and cardiovascular disease, alteration of lung tissue and structure, changes in respiratory defense mechanisms, and cancer.

2.5.3 Particulate Matter 2.5 Microns or Smaller in Diameter ($PM_{2.5}$)

$PM_{2.5}$ is a mixture of particulate matter (fine dusts and aerosols) 2.5 microns or smaller in aerodynamic diameter. 2.5 micrometers is approximately 1/30 the size of a human hair; so small that several thousand of them could fit on the period at the end of this sentence. Particles 2.5 microns or smaller get down into the deepest portions of the lungs where gas exchange occurs between the air and the blood stream. These are the most dangerous particles because the deepest portions of the lungs have no efficient mechanisms for removing them. If these particles are soluble in water, they pass directly into the blood stream within minutes. If they are not soluble in water, they are retained deep in the lungs and can remain there permanently.

Sources: $PM_{2.5}$ particles are emitted from activities such as industrial and residential combustion processes, wood burning, and from diesel and gasoline-powered vehicles. They are also formed in the atmosphere from gases such as sulfur dioxide, nitrogen oxides, ammonia, and volatile organic compounds that are emitted from combustion activities, and then become particles as a result of chemical transformations in the air (secondary particles).

Effects: $PM_{2.5}$ infiltrates the deepest portions of the lungs and remains there longer, increasing the risks of long-term disease, including chronic respiratory disease, cancer, and increased and premature death. Other effects include increased respiratory stress and disease, decreased lung function, alterations in lung tissue and structure, and alterations in respiratory tract defense mechanisms.

2.5.4 Carbon Monoxide

Carbon monoxide is a common colorless, odorless, highly toxic gas. It is produced by natural and anthropogenic combustion processes.

Sources: The major source of CO in urban areas is incomplete combustion of carbon-containing fuels (primarily gasoline, diesel fuel, and natural gas). However, it also results from combustion processes, including forest fires and agricultural burning. Over 80 percent of the CO emitted in urban areas is contributed by motor vehicles.

Ambient CO concentrations are generally higher in the winter, usually on cold, clear days and nights with little or no wind. Low wind speeds inhibit horizontal dispersion, and surface inversions inhibit vertical mixing.

Traffic-congested intersections have the potential to result in localized high levels of CO. These localized areas of elevated CO concentrations are termed CO "hotspots." CO hotspots are defined as locations where ambient CO concentrations exceed the State Ambient Air Quality Standards (20 ppm, 1-hour; 9 ppm, 8-hour).

Effects: When inhaled, CO does not directly harm the lungs. The impact from CO is on oxygenation of the entire body. CO combines chemically with hemoglobin, the oxygen-transporting component of blood. This diminishes the ability of blood to carry oxygen to the brain, heart, and other vital organs. Red blood cells have 220 times the attraction for CO than for oxygen. This affinity interferes with movement of oxygen to the body's tissues. Effects from CO exposure include headaches, nausea, and death. People with heart ailments are at risk from low-level exposure to CO. Also sensitive are people with chronic respiratory disease, the elderly, infants and fetuses, and people suffering from anemia and other conditions that affect the oxygen-carrying capacity of blood. High levels of CO in a concentrated area can result in asphyxiation. Studies show a synergistic effect when CO and ozone are combined.

2.5.5 Nitrogen Dioxide

Nitrogen dioxide is formed in the atmosphere primarily by the rapid reaction of the colorless gas nitric oxide (NO) with atmospheric oxygen. It is a reddish brown gas with an odor similar to that of bleach. NO_2 participates in the photochemical reactions that result in ozone.

Sources: The greatest source of NO, and subsequently NO_2, is the high-temperature combustion of fossil fuels such as in motor vehicle engines and power plant boilers. NO_2 and NO are referred to collectively as NOx.

Effects: NO_2 can irritate and damage the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections such as influenza. Researchers have identified harmful effects similar to those caused by ozone, with progressive changes over four hours of exposure. Negative health effects are apparent after exposure to NO_2 levels as low as 0.11 ppm for a few minutes. This level of exposure may elicit or alter sensory responses. Higher concentrations (0.45 - 1.5 ppm) may cause impaired pulmonary function, increased incidence of acute respiratory disease, and difficult breathing for both bronchitis sufferers and healthy persons.

2.5.6 Lead

Lead is a bluish-gray metal that occurs naturally in small quantities. Lead also occurs in a variety of compounds such as lead acetate, lead chloride, lead chromate, lead nitrate, and lead oxide. Pure lead is insoluble in water. However, some lead compounds are water-soluble.

Sources: Lead and lead compounds in the atmosphere often come from fuel combustion sources, such as the burning of solid waste, coal, and oils. Historically, the largest source of lead in the atmosphere resulted from the combustion of leaded gasoline in motor vehicles. However, with the phase-out of leaded gasoline, concentrations of lead in the air have substantially decreased. Industrial sources of atmospheric lead include steel and iron factories, lead smelting and refining, and battery manufacturing. Atmospheric lead may also result from lead in entrained dust and dirt contaminated with lead. Lead-based paints were commonly used in the past, and lead paint chips or dust can be inhaled or ingested.

Effects: Acute health effects of lead may include gastrointestinal distress (such as colic), brain and kidney damage, and even death. Lead also has numerous chronic health effects, including anemia, central nervous system damage, and male and female reproductive dysfunction, as well as effects on blood pressure, kidney function, and vitamin D metabolism. Developing fetuses and children are particularly sensitive to lower concentrations of blood lead, and the effects may include increased risk of pre-term delivery, low birth weight, and the impairment of hearing, growth, and mental development. The U.S. EPA's Office of Air Quality Planning and Standards ranks lead as a "high concern" pollutant based on its severe chronic toxicity. Human studies regarding the cancer risks of lead have been inconclusive. However, the U.S. EPA considers lead to be a probable human carcinogen.

2.5.7 Sulfur Dioxide

Sulfur dioxide is a colorless gas with a sharp, irritating odor. It can react in the atmosphere to produce sulfuric acid and sulfates, which contribute to acid deposition and atmospheric visibility reduction. It also contributes to the formation of PM_{10}.

Sources: Most of the SO_2 emitted into the atmosphere is from burning sulfur-containing fossil fuels by mobile sources such as marine vessels and farm equipment, and stationary fuel combustion.

Effects: SO_2 irritates the mucous membranes of the eyes and nose, and may also affect the mouth, trachea, and lungs. Healthy people may experience sore throats, coughing, and breathing difficulties when exposed to high concentrations. SO_2 causes constriction of the airways and poses a health hazard to asthmatics, who are very sensitive to SO_2. Research indicates that normally-breathing asthmatics performing moderate to heavy exercise will experience SO_2-induced bronchoconstriction (breathing difficulties) when breathing SO_2 for at least five minutes at concentrations lower than one part per million. Consecutive SO_2 exposures (repeated within 30 minutes or less) result in a diminished response compared with the initial exposure. Children often experience more respiratory tract infections when they are exposed to SO_2.

2.6 TOXIC AIR CONTAMINANTS

Toxic air contaminants (TACs), also referred to as hazardous air pollutants, are air pollutants (excluding O_3, CO, SO_2, and NO_2) that may reasonably be anticipated to cause cancer, developmental effects, reproductive dysfunction, neurological disorders, heritable gene mutations, or other serious or irreversible acute or chronic health effects in humans.

TACs are regulated under different federal and state regulatory processes than ozone and the other criteria air pollutants. Health effects of TACs may occur at extremely low levels and it is typically difficult to identify levels of exposure that do not produce adverse health effects.

TACs generally consist of four types: organic chemicals, such as benzene, dioxins, toluene, and percholorethylene; inorganic chemicals such as chlorine and arsenic; fibers such as asbestos; and metals such as mercury, cadmium, chromium, and nickel. These air contaminants are defined by the U.S. EPA, the State of California, and other governmental agencies. Currently, more than 900 substances are regulated TACs under federal, state, and local regulations. Appendix D, Major Toxic Air Contaminant Regulations and Common Toxic Air Contaminant Sources and Substances, presents the major federal and state programs and regulations to reduce toxic air contaminant emissions.

Sources: Toxic air contaminants are produced by a great variety of sources, including industrial facilities such as refineries, chemical plants, chrome plating operations, and surface coating operations; commercial facilities such as dry cleaners and gasoline stations, motor vehicles, especially diesel-powered vehicles; and, consumer products. TACs can be released as a result of normal industrial operations, as well as from accidental releases during process upset conditions.

Effects: Health effects from TACs vary with the type of pollutant, the concentration of the pollutant, the duration of exposure, and the exposure pathway. TACs usually get into the body through breathing, although they can also be ingested, or absorbed through the skin.

Adverse effects on people tend to be either acute (short-term) or chronic (long-term). Acute effects result from short-term, high levels of airborne toxic substances. These effects may include nausea, skin irritation, caridiopulomary distress, and even death. Chronic effects result from long-term, low level exposure to airborne toxic substances. Effects can range from relatively minor to life-threatening. Less serious chronic effects can include skin rashes, dry skin, coughing throat irritation, and headaches. More serious chronic effects can include lung, liver, and kidney damage; nervous system damage; miscarriages, and genetic and birth defects; and, cancer. Many TACs can have both carcinogenic and non-carcinogenic health effects.

2.7 OTHER POLLUTANTS OF CONCERN

2.7.1 San Joaquin Valley Fever

San Joaquin Valley Fever (formally known as Coccidioidomycosis) is an infectious disease caused by the fungus *Coccidioides immitis*. San Joaquin Valley Fever is also known as Valley Fever, Desert Fever, or Cocci.

Sources: Infection is caused by inhalation of *Coccidioides immitis* spores that have become airborne when dry, dusty soil or dirt is disturbed by wind, construction, farming, or other activties. The Valley Fever fungus tends to be found at the base of hillsides, in virgin, undisturbed soil. It usually grows in the top few inches of soil, but can grow down to 12 inches. The fungus does not survive well in highly populated areas because there is not usually enough undisturbed soil for the fungus to grow. Additionally, the fungus is not likely to be found in soil that has been or is being cultivated and fertilized. This is because manmade fertilizers, such as ammonium sulfate, enhance the growth of the natural microbial competitors of the Valley Fever fungus. Infection is most frequent during summers that follow a rainy winter or spring, especially after wind and dust storms. Valley Fever infection is common only in arid and semiarid areas of the Western Hemisphere. In the United States, it is mostly found from Southern California to southern Texas. In Ventura County, the Valley Fever fungus is most prevalent in the county's dry, inland regions.

Effects: In its primary form, symptoms appear as a mild upper respiratory infection, acute bronchitis, or pneumonia. The most common symptoms are fatigue, cough, chest pain, fever, rash, headache, and joint aches, although 60 percent of people infected are asymptomatic and do not seek medical attention. In the remaining 40 percent, symptoms range from mild to severe. A small percentage, less than one percent, die as a result of the disease.

The incubation period for the primary infection is from one to four weeks. Occasionally, a progressive form of Valley Fever develops from the primary form and may appear after a few weeks, months, or even years. In this progressive form, Valley Fever may cause a chronic infection of many organs, including the skin, lymph glands, spleen, liver, bones, kidneys, and brain. Individuals most vulnerable to Valley Fever are agricultural workers, construction and road workers, and archeologists, because they are exposed to the soil where the fungus might be just below the surface. Many infections, however, occur in persons without occupational exposure. Of those without an occupational risk of contracting the disease, the most susceptible are those with suppressed immune systems due to such conditions as organ transplants, HIV infection, Hodgkin's disease, diabetes, and pregnancy (3rd trimester). Domestic animals, especially dogs, are also susceptible to Valley Fever.

There are about 100,000 new cases of Valley Fever per year in the southwestern United States. The average number of reported new cases of Valley Fever in Ventura County before 1994 was 40 per year. In 1994, the year of the Northridge earthquake, the number of reported new cases of Valley Fever was 243. This increase was attributed to the great quantities of airborne dust generated by the Northridge earthquake. Since 1995, the number of reported cases has been comparable to the average before 1994. However, the actual number of cases may be much higher because Valley Fever is often misdiagnosed as the flu and not reported by physicians.

2.7.2 Odors

Odors are substances in the air that pose a nuisance to nearby land uses such as residences, schools, daycare centers, and hospitals. Odors are typically not a health concern, but can interfere with the use and enjoyment of nearby property.

Sources: Odors may be generated by a wide variety of sources. Following are examples of facilities and operations that may generate significant odors:

- Wastewater treatment facilities
- Sanitary landfills
- Transfer stations
- Composting facilities
- Asphalt batch plants
- Painting and coating operations
- Fiberglass operations
- Food processing facilities
- Feed lots/ dairies
- Petroleum extraction, transfer, processing, and refining operations and facilities
- Chemical manufacturing operations and facilities
- Rendering plants

Effects: Objectionable odors created by a facility or operation may cause a nuisance or annoyance to surrounding populations.

2.7.3 Fugitive Dust

Fugitive dust refers to solid particulate matter that becomes airborne because of wind action and human activities. Fugitive dust particles are mainly soil minerals, but also can be sea salt, pollen, spores, tire particles, etc. About half of fugitive dust particles (by weight) are larger than 10 microns and settle quickly. Fugitive dust particles 10 microns or smaller can remain airborne for weeks.

Sources: The primary sources of fugitive dust are grading and excavation operations associated with road and building construction, aggregate mining and processing operations, and sanitary landfill operations. Unpaved roadways also are a large source of fugitive dust. Other sources of fugitive dust include demolition activities, unpaved roadway shoulders, vacant lots, material stockpiles, abrasive blasting operations, and off-road vehicles. The amount of fugitive dust created by such activities is dependent largely on the type of soil, type of operation taking place, size of the area, degree of soil disturbance, soil moisture content, and wind speed.

Effects: When fugitive dust particles are inhaled, they can travel easily to the deep parts of the lungs and may remain there, causing respiratory illness, lung damage, and even premature death in sensitive people. Fugitive dust also may be a nuisance to those living and working nearby. Dust blown across roadways can lead to traffic accidents by reducing visibility. Fugitive dust can soil and damage materials and property, such as fabrics, vehicles, and buildings. Particulates deposited on agricultural crops can lower crop quality and yield. Additionally, fugitive dust can lead to the spread of San Joaquin Valley Fever, a potential health hazard caused by a fungus that lives in the soil.

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